Acantheophelan (*Profilicollis* sp) Parasite Load in the Pacific Mole Crab (*Emerita analoga*) along San Luis Obispo County beaches

Noah Doughty
Mission College Preparatory Catholic High School
ndoughty@missionprep.org (805) 543-2131 x 334
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Introduction

Students from Mission College Preparatory Catholic High School in San Luis Obispo California participated in a study to examine the parasite load of the Pacific Mole Crab (*Emerita analoga*) as part of a sand crab monitoring project initiated by the Gulf of the Farallones National Marine Sanctuary. Other studies have been made examining crab distribution and abundance. This study was restricted to parasite load.

Materials and Methods

Over a four-day period in late February 2006 sand crabs were collected from four different beaches in San Luis Obispo County. From north to south the beaches are Cayucos beach, Morro Bay, Avila Beach, and Oceano. See table 1 for approximate GPS coordinates. The sand crabs were frozen for a minimum of 12 hours and dissected in the classroom following the procedure provided by the Gulf of the Farallones National Marine Sanctuary (see http://limpets.noaa.gov/monitoring/sandyBeach/procedures.html for details). Each crab was sexed and the carapace length was measured. Female crabs bearing eggs were noted in their own category. The carapace was removed and the posterior homecoel examined for parasites.

Following the 2003 report by Saltzman and Lyday prevalence, intensity and mean abundance were calculated. Prevalence is the proportion of infected hosts at a particular site. Intensity is the mean number of individual parasites within an infected host. Mean abundance is the mean number of parasites within infected and uninfected hosts.

Results

A total of 133 sand crabs were sampled, with acanthocephalan parasites found in 75% of the crabs. Of the crabs that had parasites, the average number of parasites found was 8.9. Mean abundance for all beaches was 6.68 parasites. Prevalence ranged from 48 to 97%. The intensity rate ranged from 2.65 to 13.59 parasites per crab. Mean abundance of parasites per crabs was from 1.27 to 13.20. See table 2 for details.

Size

Of the 133 crabs measured to the nearest millimeter, the larger size classes (20 mm or greater) had higher frequency of parasites (Figure 1). The single crab found in the recruit range (9 mm or less) did not have any parasites.

Gender
Of the 132 crabs sexed, females without eggs had the highest presence of parasites, with 82% of crabs infected. For all females (females and females with eggs), nearly 80% had parasites. Male crabs had a parasite frequency (54%) most similar to that of females with eggs (57%). The singe recruit collected was not sexed and contained no parasites.

Season
Crabs from the various beaches were collected during one season only and so seasonal comparisons cannot yet be made.

Conclusion
The parasite load along San Luis Obispo County beaches compared to Gulf of Farallones National Marine Sanctuary Beaches was found to be greater in both prevalence and intensity. Prevalence along San Luis County beaches was found to be over three times higher than the numbers reported for Gulf a Farallones National Marine Sanctuary beaches, 75% vs. 24% respectively. Intensity for San Luis Obispo County Beaches was 8.9 parasites per infected crab versus 1.9 for the beaches of the Gulf of Farallones National Marine Sanctuary. Mean abundance for the Gulf of Farallones National Marine Sanctuary was not report so a comparison is not possible.

The San Luis Obispo County beach collections were made during mid winter while those of the Gulf of Farallones National Marine beaches were made during the fall and spring season. This seasonal discrepancy between the beaches could be a potential source of sampling variation. Spring and fall season sampling along San Luis Obispo County beaches should be allow for better comparison.

Recent local reports (Sneed, 2006) indicate that San Luis Obispo County beaches have a disproportionate number of sea otter (*Enhydra lutris*) deaths. Possible links between these deaths and the high parasite numbers should be investigated.

References
Saltzman and Lyday. 2003. Acanthecephalan (*Profilicollis sp*) Parasite Load in the Pacific Mole Crab (*Emerita analoga*) along Gulf of Farallones National Marine Sanctuary Beaches. Farallones Marine Sanctuary Association.

Sneed, David. April 12, 2006. Otter deaths blamed on polluted runoff. The Tibune – Newspaper of the Central Coast.

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Table 1: San Luis Obispo County Beach Collection Sites
Beaches are ranked north to south. Longitude and Latitude were determined through the GoogleEarth software program.

Beach	Latitude	Longitude
Cayucos	35°26'53 N	120°54'24 W
Morro Bay	35°22'28 N	120°51'54 W
Avila	35°10'39 N	120°43'58 W
Oceano	35°06'20 N	120°37'56 W

Table 2: Summary of parasites in sand crabs at beaches in San Luis Obispo County during February of 2006.
Beaches are ranked in order of prevalence of parasites. Avila Beach was sampled on two different days and the ranked according to combined prevalence. Size is the carapace length in mm. Prevalence is the proportion of infected hosts at a particular site. Intensity is the mean number of parasites within an infected host. Mean abundance is the mean number of parasites within infected and uninfected hosts

Site	Date	Number	%Female	Size-mean	Size-StDev	Size Range	Prevalence	Intensity	Mean Abundance
Avila	Combined	48	85 %	22	6	9-33	48	2.65	1.27
Avila	2/21/06	23	87 %	23	6	13-33	61	2.64	1.61
Avila	2/24/06	25	84 %	20	6	9-30	36	2.78	1.00
Cayucos	2/20/06	16	75 %	17	5	11-27	63	4.40	2.75
Morro Bay	2/22/06	35	94 %	23	3	15-32	97	13.59	13.20
Oceano	2/23/06	34	100 %	28	3	15-33	97	9.76	9.47

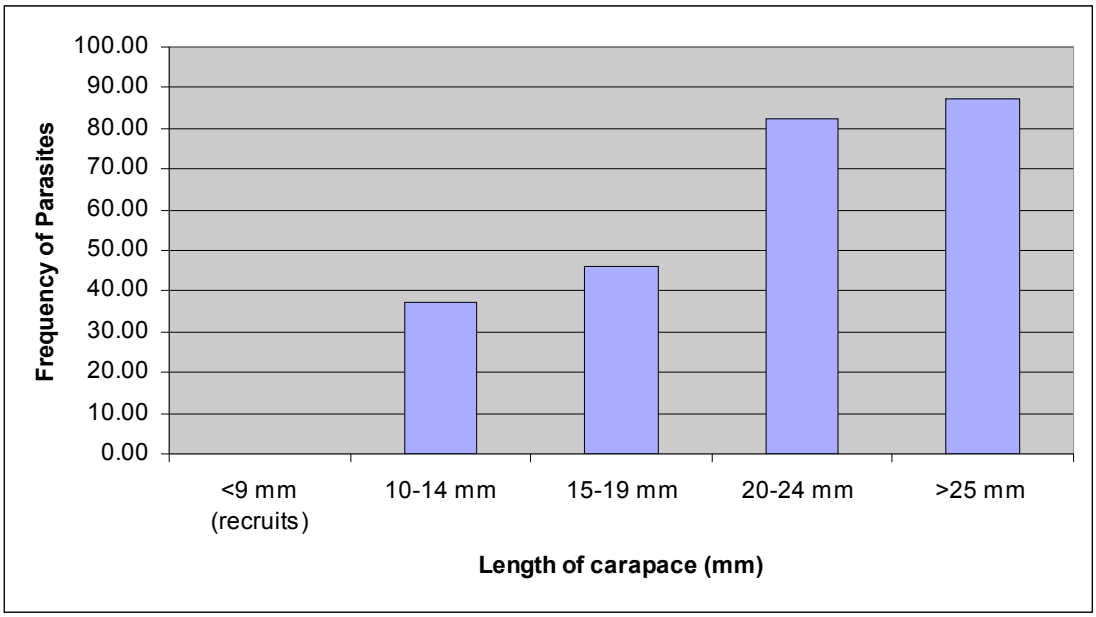

Figure 1. Parasite Frequency by Carapace Length Categories

Figure 2. Parasite Frequency by Sex